is well written and well printed, and the illustrations are numerous and accurate, and are also beautifully reproduced. By far the majority are original, although the author has, not unwisely, availed himself of good figures by other workers, especially in the domain of vertebrate histology, which has hitherto been more completely exploited than that of Invertebrata. Such a book as this fills an important hiatus in our series of text-books, and it is to be hoped that before long we shall see an English translation. It is certainly strange, considering the importance of the subject and the necessity that so many workers must have felt to be informed regarding what is known as to the minute structure of the tissues and organs in this or that class of animals, that no effort has been made, since the work of Leydig, which was published as long ago as the middle of the last century, to furnish, on modern lines, such an account of minute structure as is ably given by Dr. Schneider in this volume. Oppel's "Vergleichende Histologie" deals, it is true, with a part of the subject, but in a different manner, giving an account, more or less historical and bibliographical, of researches which have been made into the structure of particular organs and groups of organs in Vertebrata, with occasional original observations interspered; while in the book before us we find a description of structure founded mainly on the author's own observations on certain types in each class of the animal kingdom, and merely supplemented by occasional references to the work of other authors. Both methods have their value. That of Oppel tends to produce a book which is a veritable storehouse of information on the more limited subject with which it deals, but it suffers from the disadvantage that such a work must necessarily be enormously bulky and proportionately slow in coming to completion, and as a matter of fact Oppel's book, two or three volumes of which have already been noticed in NATURE, is not only very far from that stage, but it would almost appear—from the present rate of progress—that the end would never be reached at all; whereas in the work before us we have an account of the minute structure of all classes of animals which is, so far as it goes, complete, and is not unduly large considering the vast extent of the subject.

As a matter of fact, Dr. Schneider's work is compounded of three distinct parts, each of which might very well have been published as a separate book. The first of these—under the terms "Cytology" and "Organology"—comprehends an account of the structure of the tissues and organs of animals in general, the resemblances and differences being duly noted; it is, in fact, a general minute anatomy of the animal kingdom. The third or special part, which occupies by far the largest bulk, is also purely histological, but the minute structure is dealt with class by class, beginning with Porifera and ending with Vertebrata. There is in this some unavoidable repetition of the matter contained in the first part. On the other hand, the second part—which is termed "Architektonik"—is not histological at all, but morphological. It deals with the forms of Metazoa and their mode of production, and also includes the consideration of their classification, and such questions as the formation of species and the causes of variation. All this might very well have been omitted in a work dealing with histology—that is to say, a knowledge of the subject might very well have been assumed—in which case the bulk of the volume would have been reduced to more manageable proportions. Moreover, it could have been further reduced by a great diminution of the bibliography, which, although extensive, merely amounts to a collection of titles, for the papers given in it are not specifically referred to in the text. The value of such a list is not apparent, since at best it is sure to be incomplete and could, in fact, be readily compiled more efficiently from well-known publications accessible to everyone. It will appeal to authors who do not take the trouble to search out their own references or to verify them for themselves, but adds no real scientific value to a work of this sort unless the papers quoted have a direct bearing on points treated in the book itself. There are always to be found in the compilation of such lists sins both of omission and of commission—papers of a trivial and unimportant character included, and others of considerable importance omitted altogether. A bibliography, to be of actual value to the readers of a book, must not only have a general relationship to the subject-matter of the work, but a direct specific relationship to the detailed statements and conclusions of the author. As examples of what bibliographies in works on morphology should be like, those given in Balfour's "Comparative Embryology" and in Minot's "Human Embryology" may be instanced. With such as these, which add a definite value to the works which they complete, a bibliography like that in the work under review, even although it contains 36 pages of titles, contrasts unfavourably. In most other respects, Dr. Schneider's book is to be commended as a creditable attempt to supply a want which has been long felt, but which, no doubt, the magnitude of the task has hitherto deterred others from embarking upon.

It should, however, be stated that the author's method is dogmatic rather than critical, and that in disputed and controversial questions he gives the views of the Vienna school of histologists, to which he himself belongs, without, as a rule, so much as hinting that other views are held. If this is a fault, it is one which can be easily forgiven to the author of a text-book, for at least it tends to prevent a confusion of ideas on the part of the learner, to diminish the bulk of the work, and generally to present its contents in a more readable form, and one more useful to the average student.

PHILOSOPHY AND SCIENCE.

The World and the Individual. First Series: The Four Historical Conceptions of Being. By Josiah Royce, Ph.D. Pp. xvi + 588. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1900.) Price 12*s.* 6*d.* net.

The World and the Individual. Second Series: Nature, Man, and the Moral Order. By Josiah Royce, Ph.D. Pp. xvii + 480. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1901.) Price 12*s.* 6*d.* net.

IN the first series of these remarkable Gifford lectures, Prof. Royce gives us the broad outlines of an ontology which serves as the philosophical basis for the special discussion of cosmological and ethical problems contained

in his second volume. As a contribution to the investigation of ultimate metaphysical issues, Prof. Royce's first volume, like previous works by the same writer, deserves high commendation for the frequent grace of its style and the freshness and freedom from unnecessary technicalities with which the problems are presented to the reader. Metaphysics has a bad name with the cultivated public in general on the score of aridity and unintelligibility, but there is nothing in Prof. Royce's lectures that a thoughtful man of ordinary education should find unduly difficult or repellent, and there is much that every such man must find of the highest importance. Writing from a standpoint which may roughly be described as that of Hegelian idealism, but in entire freedom from mechanical adhesion to a master, and often with marked individual originality, Prof. Royce gives us a most instructive discussion of the different senses which have, in the history of human thought, been put upon the concept of Being. We are led by consideration of the complementary errors of realism and mysticism to the definition of real existence in Kantian terms as the valid, that which accords with the conditions of a "possible experience." But validity or genuine possibility must, again, rest on a basis of actual existence as part of a real experience; hence Prof. Royce conducts us from the third, or Kantian, to his own, the fourth, definition of real existence as the completed purpose or meaning of an idea. Space forbids detailed examination of his line of argument, but there are perhaps two main positions of the writer which seem hardly satisfactory as stated. It is not made sufficiently clear how it can be an "idea," in any recognised sense of the word, which ultimately sets all selective attention to work, and generally the relation between thought and will is left in some obscurity. Thus, both in the first and second series of lectures, Prof. Royce often seems to imply the very doubtful view that voluntary attention is the same thing as a volition to attend, but he nowhere explicitly states his position on the question. A minor peculiarity in the first series, which is perhaps open to attack, is the use made of certain logical theories in criticising the Kantian conception of reality. Prof. Royce might reconsider, in the light of objections with which he is no doubt familiar, but which he nowhere meets, the view, adopted by him from the writers on symbolic logic, of the universal proposition as a negative existential judgment.

To the professed metaphysician the most important thing in the two volumes will be the supplementary essay to vol. i., in which ingenious use is made of the modern theory of infinite series, as expounded by Dedekind and others, as the basis of a defence of the conception of the Absolute as a Self against the negative dialectic of Mr. F. H. Bradley. The argument cannot be dealt with here, but one difficulty may be noted. Prof. Royce, if I understand him rightly, assumes a very direct relation between validity and actuality. He appears to take it for granted that if you can reason about an infinite series in mathematics, it must be possible for that series to be actually summed; or again, that every proposition of an infinite series of propositions which would be true if made must actually be thought by some mind. As the infinite series of such minds, according to Prof. Royce's view, in its entirety makes up the mind of God, it would seem to follow that the *infinitus intellectus Dei*, which we are assured knows all that we know, just as we know it, is like nothing so much as an infinitely extended Bradshaw's Guide without an index. Before we can adopt this view, we need, I think, a more searching investigation into the relation of mathematical truth to actual fact than Prof. Royce has supplied. Is it, after all, allowable to assume without criticism that mathematical conceptions must be the exact counterpart of actual existence?

In the second series of his lectures, Prof. Royce uses the metaphysical standpoint secured in the first volume as the basis for a striking theory of the real character of the processes which appear to our senses as the physical order. His general thesis is one which seems inevitable if we accept the premisses of idealism, that what we perceive as physical nature is a vast society of purposive and intelligent beings, which appears to us to be a dead mechanism simply because we have no direct insight into the special nature of the purposive life which animates it. In connection with this general thesis, Prof. Royce supplies an invaluable criticism of the notion of uniformity or "natural law" and a most suggestive attempt at a philosophical interpretation of the empirical facts of evolution.

The concluding essays of the series contain a striking vindication of the doctrine of moral freedom and an ingenious argument for human immortality, in a sense rather different from that commonly put on the term. I hope it is not ungracious, in the presence of such a wealth of suggestive discussion of topics of vital interest, to suggest that Prof. Royce's psychology is sometimes of a doubtful kind. More than once he seems to make the contrast between my self as it is in time and my "self in eternity," with its complete insight into the solution of the problems my temporal self finds insoluble, so sharp as to amount to a positive ascription of two distinct types of existence to the same individual. His eternal self becomes, especially in the last lecture, so much a sort of lesser god, and so remote from the struggling, perplexed creature I know as my temporal self, that it is not quite easy to see how the two can ultimately be one. His doctrine of sin, deeply true as many of his statements are felt to be, again, seems to me to involve the already mentioned confusion between attending voluntarily and willing to attend. Lastly, the argument for the temporal immortality of every self might perhaps be found hardly consistent with the admission of the temporal origination of new selves by evolution. Does not evolution involve the disappearance of selves in precisely the same sense in which it involves their origination? Prof. Royce's argument, if pressed, ought to prove immortality *ex parte ante* as well as *ex parte post*. And, in view of his general acceptance of a clarified Christianity, it is not improper to ask whether Prof. Royce agrees with all serious forms of Christian doctrine in recognising the possibility that some selves may be finally "lost," and, if so, how he interprets such ultimate loss. Misgivings of this kind, however, need in no way detract from our admiration of the courage with which Prof. Royce has essayed the task of bringing idealistic philosophy into line with the positive results of empirical science, and of the vast originality and ability with which that task has been, on the whole, executed. The Gifford trustees are indeed

to be congratulated on having been the immediate causes of the publication of three such works as the Gifford lectures of Profs. Ward, Royce and James. There have been few equally important additions to English philosophical speculation in recent years. A. E. TAYLOR.

THE PARALLEL RUNNING OF ALTERNATORS.

Der Parallelbetrieb von Wechselstrommaschinen. By Dr. Gustav Benischke. Pp. 55. (Brunswick: Friedrich Vieweg und Sohn, 1902.) Price M. 1.20.

THE second volume of "Elektrotechnik in Einzel-Darstellungen," of which the first was mentioned in these columns some time ago, appears in the above form and fully sustains, if it does not surpass, the excellent character of the first volume. Besides the general normal parallel running of alternators, including, of course, polyphase machines, the disturbing influences which make parallel running difficult or impossible are discussed. To the mathematically inclined, the theoretical explanation of the phenomena met with in the parallel running of alternating-current machinery offers exceptional opportunity for a fine display of mathematical calculations and formulæ. Fortunately, Dr. Benischke is not so inclined, and in his preface declares that the physical explanation of the phenomena appeals more directly to one's intelligence than the mathematical, and that, in the cases under consideration, the swinging and falling out of step of alternators, the mathematical method is not much good, as it is not possible thereby to prophesy whether two machines will run in parallel or not. This is, of course, what has been found in practice, and it is now usual in the construction of alternators to so design them that means for the prevention of swinging (Le Blanc's damping rings) can be placed in position should it prove necessary. The author is to be particularly congratulated on chapters x. and xi., in which these matters are discussed, for the very clear and logical manner in which he has put them.

As an introduction, the first three chapters of the book deal with the parallel running of continuous-current machinery, and the question of motor current and division of the load between the parallel sets. With continuous-current generators, the division of the load between the machines is a question for the switchboard attendant, who simply has to regulate the exciting currents, the steam-engine governors doing the rest. With alternators, the task becomes more difficult, for not only have we the additional necessity of the machines being in synchronism one with the other, but also the proper division of the load between the generators can only be attained by concurrent adjustment of both the exciting current and the steam admission. This is due to the fact that increase of the excitation of the unloaded machine is not followed by a diminution in speed due to current flowing, followed by a greater admission of steam, as in a direct-current machine, as the alternator is kept at the same speed always, being in synchronism. The proper division of the load between the alternators becomes, therefore, largely the work of the engine-driver, acting under the instructions received from the switchboard attendant, while the latter has to see that the wattless current given by the machines is kept at a minimum by the proper regulation of the exciting currents. In accordance with German practice, the author recommends the use of an indicating wattmeter or power-factor indicator on each machine to control the power factor. This has not been the usual practice in England, as the matter can just as well be done by regulating to minimum current on the machine ammeters. To-day, recording power-factor indicators are being demanded in England; this is presumably to enable the engineer to have a check on his assistants. They are also, so far as we are aware, only for use on circuits off which synchronous substation machinery is running, where the question of power factor is of greater importance than in the case now considered.

We can now only refer to the other chapters in the book, which treat of the influence of the shape of the current and electromotive-force curves, the electrical connections for parallel running with diagrams, synchronisers, under which we did not find a description of the Lincoln synchroniser, which we think is an omission, parallel running of machines situated on the same axil, and of alternators driven by gas engines. We can warmly recommend the book to all who seek trustworthy and detailed information on this important engineering subject. C. C. G.

OUR BOOK SHELF.

Hand- und Hülfsbuch zur Ausführung physiko-chemischer Messungen. By W. Ostwald und R. Luther. Zweite Auflage. Pp. xii + 492. (Leipzig: W. Engelmann.) Price 15*s.* net.

THE second edition of this well-known work will undoubtedly be welcomed by a large circle of students and teachers, the more so since for some time the first edition has been out of print. The cooperation of the original author with Dr. Luther in the production of the second edition has resulted in a considerable number of changes being made in the book; a new work is, in fact, the result. Dr. Luther's long experience as demonstrator and later as subdirector of the Physico-chemical Institute at Leipzig has made him specially fitted for this collaboration, and the value of the book is greatly enhanced by the results of his daily contact with the practical difficulties of students engaged in physico-chemical work.

In the new edition, the headings of the first fifteen chapters agree with those of the first issue. Considerable changes have, however, been made in detail by the introduction of new matter. The sixteenth chapter of the original edition is represented by five chapters in the present one, the headings of which are respectively electrical measurements, electromotive force, conductivity of electrolytes (dielectric constant), quantity of electricity and transport number and finally electrical measuremen of temperature. In this portion of the book, the chief work of reconstruction has been performed. The twentieth chapter deals with chemical dynamics, and a new chapter has been added on the application of physico-chemical methods to chemical questions.

Noteworthy alterations in detail are the introduction of a number of new tables of useful data, the use of the new unit for the expression of conductivity values and the inclusion of copious references to original papers dealing with the subject-matter in hand. Special forms of apparatus and details of manipulation which cannot be included in a practical text-book of anything like modest